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# Reference Manual on Scientific Evidence

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# Reference Guide on Survey Research

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# I. Introduction

*Sample surveys* are used to describe or enumerate the beliefs, attitudes, or behavior of persons or other social units.<sup>1</sup> Surveys typically are offered in legal proceedings to establish or refute claims about the characteristics of those individuals or social units (e.g., whether consumers are likely to be misled by the claims contained in an allegedly deceptive advertisement;<sup>2</sup> which qualities purchasers focus on in making decisions about buying new computer systems).<sup>3</sup> In a broader sense, a *survey* can describe or enumerate the attributes of any units, including animals and objects.<sup>4</sup> We focus here primarily on sample surveys, which must deal not only with issues of population definition, sampling, and measurement common to all surveys, but also with the specialized issues that arise in obtaining information from human respondents.

In principle, surveys may count or measure every member of the relevant population (e.g., all plaintiffs eligible to join in a suit, all employees currently working for a corporation, all trees in a forest). In practice, surveys typically count or measure only a portion of the individuals or other units that the survey is intended to describe (e.g., a sample of jury-eligible citizens, a sample of potential job applicants). In either case, the goal is to provide information on the relevant population from which the sample was drawn. Sample surveys can be carried out using probability or nonprobability sampling techniques. Although probability sampling offers important advantages over nonprobability sampling,<sup>5</sup> experts in some fields (e.g., marketing) regularly rely on various forms of nonprobability sampling when conducting surveys. Consistent with Federal Rule of Evidence 703, courts generally have accepted such evidence.<sup>6</sup> Thus, in this reference guide, both the probability sample and the nonprobability sample are discussed. The strengths of probability sampling and the weaknesses of various types of non-probability sampling are described.

1. Sample surveys conducted by social scientists “consist of (relatively) systematic, (mostly) standardized approaches to collecting information on individuals, households, organizations, or larger organized entities through questioning systematically identified samples.” James D. Wright & Peter V. Marsden, *Survey Research and Social Science: History, Current Practice, and Future Prospects*, in *Handbook of Survey Research* 1, 3 (James D. Wright & Peter V. Marsden eds., 2d ed. 2010).

2. See *Sanderson Farms v. Tyson Foods*, 547 F. Supp. 2d 491 (D. Md. 2008).

3. See *SMS Sys. Maint. Servs. v. Digital Equip. Corp.*, 118 F.3d 11, 30 (1st Cir. 1999). For other examples, see notes 19–32 and accompanying text.

4. In *J.H. Miles & Co. v. Brown*, 910 F. Supp. 1138 (E.D. Va. 1995), clam processors and fishing vessel owners sued the Secretary of Commerce for failing to use the unexpectedly high results from 1994 survey data on the size of the clam population to determine clam fishing quotas for 1995. The estimate of clam abundance is obtained from surveys of the amount of fishing time the research survey vessels require to collect a specified yield of clams in major fishing areas over a period of several weeks. *Id.* at 1144–45.

5. See *infra* Section III.C.

6. Fed. R. Evid. 703 recognizes facts or data “of a type reasonably relied upon by experts in the particular field. . . .”



in these waters?”<sup>144</sup>). Closed-ended questions provide the respondent with an explicit set of responses from which to choose; the choices may be as simple as *yes* or *no* (e.g., “Is Colby College coeducational?”<sup>145</sup>) or as complex as a range of alternatives (e.g., “The two pain relievers have (1) the same likelihood of causing gastric ulcers; (2) about the same likelihood of causing gastric ulcers; (3) a somewhat different likelihood of causing gastric ulcers; (4) a very different likelihood of causing gastric ulcers; or (5) none of the above.”<sup>146</sup>). When a survey involves in-person interviews, the interviewer may show the respondent these choices on a showcard that lists them.

Open-ended and closed-ended questions may elicit very different responses.<sup>147</sup> Most responses are less likely to be volunteered by respondents who are asked an open-ended question than they are to be chosen by respondents who are presented with a closed-ended question. The response alternatives in a closed-ended question may remind respondents of options that they would not otherwise consider or which simply do not come to mind as easily.<sup>148</sup>

The advantage of open-ended questions is that they give the respondent fewer hints about expected or preferred answers. Precoded responses on a closed-ended question, in addition to reminding respondents of options that they might not otherwise consider,<sup>149</sup> may direct the respondent away from or toward a particular response. For example, a commercial reported that in shampoo tests with more than 900 women, the sponsor’s product received higher ratings than

144. A relevant example from *Wilhoite v. Olin Corp.* is described in McGovern & Lind, *supra* note 31, at 76.

145. *Presidents & Trustees of Colby College v. Colby College—N.H.*, 508 F.2d 804, 809 (1st Cir. 1975).

146. This question is based on one asked in *American Home Products Corp. v. Johnson & Johnson*, 654 F. Supp. 568, 581 (S.D.N.Y. 1987), that was found to be a leading question by the court, primarily because the choices suggested that the respondent had learned about aspirin’s and ibuprofen’s relative likelihood of causing gastric ulcers. In contrast, in *McNeilab, Inc. v. American Home Products Corp.*, 501 F. Supp. 517, 525 (S.D.N.Y. 1980), the court accepted as nonleading the question, “Based only on what the commercial said, would Maximum Strength Anacin contain more pain reliever, the same amount of pain reliever, or less pain reliever than the brand you, yourself, currently use most often?”

147. Howard Schuman & Stanley Presser, *Question Wording as an Independent Variable in Survey Analysis*, 6 Soc. Methods & Res. 151 (1977); Schuman & Presser, *supra* note 134, at 79–112; Converse & Presser, *supra* note 126, at 33.

148. For example, when respondents in one survey were asked, “What is the most important thing for children to learn to prepare them for life?”, 62% picked “to think for themselves” from a list of five options, but only 5% spontaneously offered that answer when the question was open-ended. Schuman & Presser, *supra* note 134, at 104–07. An open-ended question presents the respondent with a free-recall task, whereas a closed-ended question is a recognition task. Recognition tasks in general reveal higher performance levels than recall tasks. Mary M. Smyth et al., *Cognition in Action* 25 (1987). In addition, there is evidence that respondents answering open-ended questions may be less likely to report some information that they would reveal in response to a closed-ended question when that information seems self-evident or irrelevant.

149. Schwarz & Hippler, *supra* note 133, at 43.

If the survey is designed to allow for probes, interviewers must be given explicit instructions on when they should probe and what they should say in probing.<sup>158</sup> Standard probes used to draw out all that the respondent has to say (e.g., “Any further thoughts?” “Anything else?” “Can you explain that a little more?” Or “Could you say that another way?”) are relatively innocuous and non-controversial in content, but persistent continued requests for further responses to the same or nearly identical questions may convey the idea to the respondent that he or she has not yet produced the “right” answer.<sup>159</sup> Interviewers should be trained in delivering probes to maintain a professional and neutral relationship with the respondent (as they should during the rest of the interview), which minimizes any sense of passing judgment on the content of the answers offered. Moreover, interviewers should be given explicit instructions on when to probe, so that probes are administered consistently.

A more difficult type of probe to construct and deliver reliably is one that requires a substantive question tailored to the answer given by the respondent. The survey designer must provide sufficient instruction to interviewers so that they avoid giving directive probes that suggest one answer over another. Those instructions, along with all other aspects of interviewer training, should be made available for evaluation by the court and the opposing party.

### *E. What Approach Was Used to Avoid or Measure Potential Order or Context Effects?*

The order in which questions are asked on a survey and the order in which response alternatives are provided in a closed-ended question can influence the answers.<sup>160</sup> For example, although asking a general question before a more specific question on the same topic is unlikely to affect the response to the specific question, reversing the order of the questions may influence responses to the general question. As a rule, then, surveys are less likely to be subject to order effects if the questions move from the general (e.g., “What do you recall being discussed

158. Floyd J. Fowler, Jr. & Thomas W. Mangione, *Standardized Survey Interviewing: Minimizing Interviewer-Related Error* 41–42 (1990).

159. See, e.g., *Johnson & Johnson–Merck Consumer Pharms. Co. v. Rhone-Poulenc Rorer Pharms., Inc.*, 19 F.3d 125, 135 (3d Cir. 1994); *American Home Prods. Corp. v. Procter & Gamble Co.*, 871 F. Supp. 739, 748 (D.N.J. 1994).

160. See Schuman & Presser, *supra* note 134, at 23, 56–74. Krosnick & Presser, *supra* note 126, at 278–81. In *R.J. Reynolds Tobacco Co. v. Loew’s Theatres, Inc.*, 511 F. Supp. 867, 875 (S.D.N.Y. 1980), the court recognized the biased structure of a survey that disclosed the tar content of the cigarettes being compared before questioning respondents about their cigarette preferences. Not surprisingly, respondents expressed a preference for the lower tar product. See also *E. & J. Gallo Winery v. Pasatiempos Gallo, S.A.*, 905 F. Supp. 1403, 1409–10 (E.D. Cal. 1994) (court recognized that earlier questions referring to playing cards, board or table games, or party supplies, such as confetti, increased the likelihood that respondents would include these items in answers to the questions that followed).

Telephone surveys that do not include these procedures may not provide precise measures of the characteristics of a representative sample of respondents, but may be adequate for providing rough approximations. The vulnerability of the survey depends on the information being gathered. More elaborate procedures are advisable for achieving a representative sample of respondents if the survey instrument requests information that is likely to differ for individuals with listed telephone numbers versus individuals with unlisted telephone numbers, individuals rarely at home versus those usually at home, or groups who are more versus less likely to rely exclusively on cell phones.

The report submitted by a survey expert who conducts a telephone survey should specify:

1. The procedures that were used to identify potential respondents, including both the procedures used to select the telephone numbers that were called and the procedures used to identify the qualified individual to question),
2. The number of telephone numbers for which no contact was made; and
3. The number of contacted potential respondents who refused to participate in the survey.<sup>203</sup>

Like CAPI interviewing,<sup>204</sup> computer-assisted telephone interviewing (CATI) facilitates the administration and data entry of large-scale surveys.<sup>205</sup> A computer protocol may be used to generate and dial telephone numbers as well as to guide the interviewer.

### 3. Mail questionnaires

In general, mail surveys tend to be substantially less costly than both in-person and telephone surveys.<sup>206</sup> Response rates tend to be lower for self-administered mail surveys than for telephone or face-to-face surveys, but higher than for their Web-based equivalents.<sup>207</sup> Procedures that raise response rates include multiple mailings, highly personalized communications, prepaid return envelopes, incentives or gratuities, assurances of confidentiality, first-class outgoing postage, and followup reminders.<sup>208</sup>

203. Additional disclosure and reporting features applicable to surveys in general are described in Section VII.B, *infra*.

204. See text accompanying note 194, *supra*.

205. See Roger Tourangeau et al., *The Psychology of Survey Response* 289 (2000); Saris, *supra* note 190.

206. See Chase H. Harrison, *Mail Surveys and Paper Questionnaires*, in *Handbook of Survey Research*, *supra* note 1, at 498, 499.

207. See Mick Couper et al., *A Comparison of Mail and E-Mail for a Survey of Employees in Federal Statistical Agencies*, 15 J. Official Stat. 39 (1999); Mick Couper, *Web Surveys: A Review of Issues and Approaches* 464, 473 (2001).

208. See, e.g., Richard J. Fox et al., *Mail Survey Response Rate: A Meta-Analysis of Selected Techniques for Inducing Response*, 52 Pub. Op. Q. 467, 482 (1988); Kenneth D. Hopkins & Arlen R.

A mail survey will not produce a high rate of return unless it begins with an accurate and up-to-date list of names and addresses for the target population. Even if the sampling frame is adequate, the sample may be unrepresentative if some individuals are more likely to respond than others. For example, if a survey targets a population that includes individuals with literacy problems, these individuals will tend to be underrepresented. Open-ended questions are generally of limited value on a mail survey because they depend entirely on the respondent to answer fully and do not provide the opportunity to probe or clarify unclear answers. Similarly, if eligibility to answer some questions depends on the respondent's answers to previous questions, such skip sequences may be difficult for some respondents to follow. Finally, because respondents complete mail surveys without supervision, survey personnel are unable to prevent respondents from discussing the questions and answers with others before completing the survey and to control the order in which respondents answer the questions. Although skilled design of questionnaire format, question order, and the appearance of the individual pages of a survey can minimize these problems,<sup>209</sup> if it is crucial to have respondents answer questions in a particular order, a mail survey cannot be depended on to provide adequate data.

#### 4. Internet surveys

A more recent innovation in survey technology is the Internet survey in which potential respondents are contacted and their responses are collected over the Internet. Internet surveys in principle can reduce substantially the cost of reaching potential respondents. Moreover, they offer some of the advantages of in-person interviews by enabling the respondent to view pictures, videos, and lists of response choices on the computer screen during the survey. A further advantage is that whenever a respondent answers questions presented on a computer screen, whether over the Internet or in a dedicated facility, the survey can build in a variety of controls. In contrast to a mail survey in which the respondent can examine and/or answer questions out of order and may mistakenly skip questions, a computer-administered survey can control the order in which the questions are displayed so that the respondent does not see a later question before answering an earlier one and so that the respondent cannot go back to change an answer previously given to an earlier question in light of the questions that follow it. The order of the questions or response options can be rotated easily to control for order effects. In addition, the structure permits the survey to remind, or even require, the respondent to answer a question before the next question is presented. One advantage of computer-administered surveys over interviewer-administered

Gullickson, *Response Rates in Survey Research: A Meta-Analysis of the Effects of Monetary Gratuities*, 61 J. Experimental Educ. 52, 54–57, 59 (1992); Eleanor Singer et al., *Confidentiality Assurances and Response: A Quantitative Review of the Experimental Literature*, 59 Pub. Op. Q. 66, 71 (1995); see generally Don A. Dillman, *Internet Mail and Mixed-Mode Surveys: The Tailored Design Method* (3d ed. 2009).

209. Dillman, *supra* note 208, at 151–94.

surveys is that they eliminate interviewer error because the computer presents the questions and the respondent records her own answers.

Internet surveys do have limitations, and many questions remain about the extent to which those limitations impair the quality of the data they provide. A key potential limitation is that respondents accessible over the Internet may not fairly represent the relevant population whose responses the survey was designed to measure. Although Internet access has not approached the 95% penetration achieved by the telephone, the proportion of individuals with Internet access has grown at a remarkable rate, as has the proportion of individuals who regularly use a computer. For example, according to one estimate, use of the Internet among adults jumped from 22% in 1997 to 60% in 2003.<sup>210</sup> Despite this rapid expansion, a digital divide still exists, so that the “have-nots” are less likely to be represented in surveys that depend on Internet access. The effect of this divide on survey results will depend on the population the survey is attempting to capture. For example, if the target population consists of computer users, any bias from systematic underrepresentation is likely to be minimal. In contrast, if the target population consists of owners of television sets, a proportion of whom may not have Internet access, significant bias is more likely. The trend toward greater access to the Internet is likely to continue, and the issue of underrepresentation may disappear in time. At this point, a party presenting the results of a Web-based survey should be prepared to provide evidence on how coverage limitations may have affected the pattern of survey results.

Even if noncoverage error is not a significant concern, courts evaluating a Web-based survey must still determine whether the sampling approach is adequate. That evaluation will depend on the type of Internet survey involved, because Web-based surveys vary in fundamental ways.

At one extreme is the list-based Web survey. This Web survey is sent to a closed set of potential respondents drawn from a list that consists of the e-mail addresses of the target individuals (e.g., all students at a university or employees at a company where each student or employee has a known e-mail address).

At the other extreme is the self-selected Web survey in which Web users in general, or those who happen to visit a particular Web site, are invited to express their views on a topic and they participate simply by volunteering. Whereas the list-based survey enables the researcher to evaluate response rates and often to assess the representativeness of respondents on a variety of characteristics, the self-selected Web survey provides no information on who actually participates or how representative the participants are. Thus, it is impossible to evaluate nonresponse error or even participation rates. Moreover, participants are very likely to self-select on the basis of the nature of the topic. These self-selected pseudosurveys resemble reader polls published in magazines and do not meet standard criteria for legitimate surveys

210. Jennifer C. Day et al., *Computer and Internet Use in the United States: 2003*, 8–9 (U.S. Census Bureau 2005).